



The Decommissioning In-Situ Plutonium Inventory Monitor (DISPIM) System

Neutron coincidence assay tool meets the needs of the site

In the course of the Rocky Flats Closure Project, approximately one thousand gloveboxes and hundreds of process vessels have been identified as contaminated with plutonium. This equipment must be removed, size-reduced, and disposed of as radioactively-contaminated waste. The baseline method of in-situ plutonium assay of this type of equipment is by manual gamma-scan equipment. The Rocky Flats Environmental Technology Site, in conjunction with the Accelerated Site Technology Deployment (ASTD) program, has identified nondestructive assay equipment with lower levels of sensitivity and higher accuracy for this work as a critical step in achieving the accelerated site closure goal of 2006. These measurements are needed during the deactivation and decommissioning (D&D) planning stage to organize work tasks and better estimate transuranic (TRU) and low-level waste generation rates.

The Decommissioning In-Situ Plutonium Inventory Monitor (DISPIM™), manufactured by BNFL Instruments, is a neutron coincidence assay tool which meets the needs of the site. The system is capable of providing measurements as well as 3-D imaging of plutonium within gloveboxes and vessels. The DISPIM™ System has lower sensitivity and greater accuracy than current

on-site systems. This improved technology will provide a means to accurately map plutonium hold-up in process equipment awaiting D&D and therefore provide paybacks in terms of time-savings, reduced TRU waste volume, and keeping worker exposure levels "as low as reasonably achievable" (ALARA). The DISPIM™ System was deployed successfully in September 1998 with on-site training ongoing through December 1998. DISPIM™ is expected to be utilized for D&D planning in selected areas of the site beginning in Summer 1999.

The DISPIM™ System has greater accuracy than traditional gamma-based measuring techniques

Accurate methods of determining concentrations of plutonium contamination in gloveboxes and vessels are needed to assist in work planning during dismantlement and size reduction activities. Such work planning includes the selection of personal protective equipment (PPE), contamination control, and TRU/low-level waste segregation.

Essentially two methods are available to measure plutonium hold-up in process equipment. The first technique measures gamma radiation, and the second measures neutron radiation. In using traditional gamma-based measuring techniques, the most useful radioactive emissions are quickly absorbed by both in-box

machinery and lead shielding. Therefore, depending on the gamma modeling technique used, a potential exists to significantly over- or under-estimate the plutonium content of the item being measured.

Traditionally, the site has used only gamma-based systems to measure plutonium hold-up. When compared to gamma-based systems, a passive neutron coincidence counting system is not affected so significantly by lead shielding and high background radiation. It will also have lower levels of detection and greater accuracy than gamma systems.

Assaying made easier with DISPIM™ System

The DISPIM™ system is an in-situ glovebox and vessel assay and imaging tool. It has been designed to assay gloveboxes, process vessels, and equipment having a wide variety of shapes, sizes, and orientations. The system was developed by BNFL Instruments and is being used at the BNFL Sellafield site and at other European nuclear facilities. The DISPIM™ is a modular passive neutron coincidence counting system that can assay gloveboxes and vessels in place with a typical count time of a few hours and detection limits to approximately one (1) gram of plutonium. The site's current gamma-based system has a detection limit of approximately six (6) grams of plutonium. The DISPIM™ system's imaging capability provides a 3-D map of the distribution of the plutonium detected in the glovebox or vessel.

The DISPIM™ system provides improved sensitivity, accuracy, and precision compared to current methods, resulting in greater confidence in measurement values obtained.

More accurate measurements allow for more efficient planning in the following areas:

- Identifying glovebox hot spots for selecting method of decontamination (where appropriate)
- Formulating size reduction strategies

- Segregating TRU and low-level waste; reducing the volume of TRU waste generated on the Site
- Reducing waste management and disposal costs and easing on-site interim storage limitations for TRU waste
- Maintaining exposure levels to ALARA through proper handling
- Providing information needed for health and safety reviews
- Establishing PPE requirements; reducing PPE requirements (i.e., from supplied air suits to full-face respirators) while maintaining worker safety, resulting in cost savings without additional worker exposure risk
- Establishing support staff requirements

The DISPIM™ system is one of multiple technologies currently included in the Rocky Flats ASTD project. This project is jointly funded by the site and the U.S.

Department of Energy Office of Science and Technology (EM-50). Other technologies in the ASTD project include enhanced mechanical cutting tools and a mobile, WIPP-certified, standard waste box counter.

EM-50 has provided \$3 million in support of the site's ASTD project. Of this \$3 million, approximately \$1 million will be used to procure the DISPIM™ system. Additional site costs associated with implementation of the system are anticipated to exceed \$1 million. The DISPIM™ system was deployed September 1998.



A raised DISPIM™ assembly.



U.S. Department of Energy

Make It Safe. Clean It Up. Close It Down.



For further information about Rocky Flats

Contact DOE Communication at (303) 966-5993, or Kaiser-Hill Communication at (303) 966-2882, or toll free at (800) 269-0157 (press *82882# when you hear the automated attendant)

Also, additional information about Rocky Flats is available on the internet at: <http://www.rfets.gov>